

# CSD100

## Controlled Switching of Power Transformers

### Challenges

Connecting and disconnecting intermittent power sources such as wind or solar farms, pumped storage, or gas power plants from the grid may generate switching transients. These transients can cause electrical stresses on critical substation equipment, such as power transformers, and can introduce power quality issues, such as high inrush currents and voltage dips into the system.

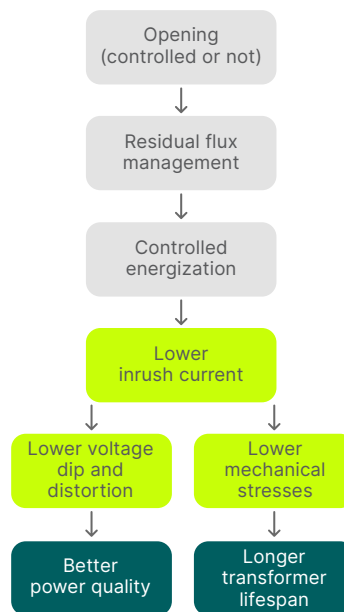
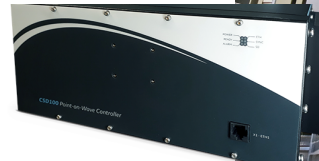
### Safe Connection of Transformers to the Grid

Grid Solutions' CSD100 is an advanced point-on-wave controller that enables the mitigation of potentially harmful transients that result from switching operations. The CSD100 works by matching source flux to a transformer's residual flux in order to efficiently switch and connect the transformer to the grid. This active management ensures inrush currents and voltage dips are minimized, thereby improving power quality and extending transformer life.

The CSD100 learns as it operates. With active recording of voltage signals and other key electrical parameters during switching events, the CSD100 automatically calculates residual magnetic flux in the transformer's core and dynamically adjusts control operations for a low-flux grading, ensuring lower inrush currents.

### Securing Your Primary Equipment

- With extensive data acquisition and storage capabilities, the CSD100 allows for extensive monitoring and improved switching to protect equipment. Together with its digital communication abilities, the CSD100 plays a key role in your asset performance management (APM) strategy.
- CSD100's design simplifies substation integration and commissioning.
- Built-in cybersecurity features in line with the latest NERC, IEC, and IEEE standards ensure a high security level.



*CSD100 operation cycle*

### Safe Connectivity of Intermittent Generation

- Voltage dip reduction
- Inrush current mitigation
- Transformer stress limitation

### Advanced Communications

- IEC 61850-8-1
- Simplified integration into digital substations and associated secondary systems
- Secure, web-based HMI for situational awareness and simplified operational management

### Reliable and Versatile

- Switching performance evaluation
- High-speed transient recorder
- Multiple load switching feature
- Assisted commissioning mode
- Flexible mounting options (DIN Rail or 19" bay mounting)

### Grid Solutions' Advantage

- Expert solution from a high-voltage original equipment manufacturer combining circuit breaker and controlled switching device
- Long-lasting experience: fourth generation of point-on wave controllers



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Switching Transients Mitigation

LOAD	OPERATION	PRIMARY GOAL	MITIGATION PRINCIPLE
Power transformers in no-load condition	Controlled opening	Minimize residual flux	Switching-out at voltage peak
	Uncontrollable opening (e.g. protection trip)	Assess residual flux	
	Controlled closing	Reduce inrush current Limit voltage dip	Closing when prospective flux equals residual flux

Self-Adaptation for High Accuracy

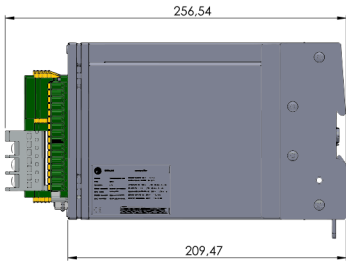
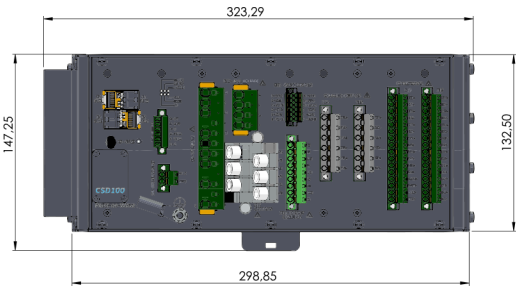
To provide and maintain switching accuracy, the CSD100 takes key circuit breaker condition data into consideration, including ambient temperature, DC control voltage, driving pressure of hydraulic mechanisms, circuit breaker idle time, long-term operation time drift, and more.

General Ratings

DESCRIPTION	VALUE
Weight	5.8 kg (12.8 lbs) with rack mounting brackets
Operation temperature range	-40°C to +55°C (continuous) / -40°C to + 70°C (16h)
Enclosure class	IP5x
Product electrical safety	IEC 60950-1; IEC 60255-27
EMC compliance	IEC 61000-6-5; IEC 60255-26; EN 55032
Power consumption	< 30 W
Switching time resolution	< 0.01 ms
Transient data acquisition	40 kHz
Input transducer interfaces	4 × 4-20 mA, 24 V, 2 or 3 wires
Digital communication interface	100 Mbits/s/ and/or 1 Gbit/s SFP transceiver x 4 (RJ45 × 2 / LC optic fiber x 2)
Alarm signaling	2 relays available for signaling urgent and non-urgent alarms
LEDs signaling	6 LEDs available to deliver status of the controller (power supply, ready to operate)
Switching performance evaluation	Accuracy of the controlled closing and controlled opening operations, within the required tolerance
Counter	Number of controlled and random operations

Dimensions

Example for DIN rail mounting (installation in low-voltage cabinet of the circuit breaker).



Other mounting possibility: 19" rack front panel  
Optional: Local HMI upon request

For more information, visit [governova.com/grid-solutions](https://governova.com/grid-solutions)

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